

cision through the scalp is made along the temporal ridge, the flap turned down, and the fascia and muscle split in the direction of their fibers. In decompression for basal fractures the scalp incision can be made obliquely backwards parallel to the fibers of the posterior portion of the temporal muscle. The periosteum should be scraped back and the underlying skull removed for an area of two by three or four inches without disturbing the temporal ridge, the origin of the muscle. The dura should then be opened and a portion of it excised, care being exercised with regard to the meningeal vessels. The temporal muscle, fascia and scalp should now be carefully sutured in layers without drainage. The right temporal region is the area of choice in right handed persons, but if sufficient decompression is not obtained, the opposite side should be similarly treated.

For the exposure of the suboccipital region, a crossbow incision is usually made—a curved, transverse incision just below the origin of the superficial muscles, the trapezius and complexus, joined by a vertical in the median line of the neck. After dividing these muscles about an inch below their origin, and the ligamentum nuchae in the median line the occipital bone is exposed by scraping away the periosteum and the attached deeper muscles. The bone is then removed with a rongeur, beginning at either side, for the hemorrhage from the diploe is apt to be embarrassing as the median line is approached. For the control of the emissary veins Cushing employs dry absorbent cotton which promotes coagulation. The occipital bone can be removed if necessary as far as the foramen magnum. The dura should then be incised on either side of the occipital sinus and the sinus divided between ligatures as advocated by Frazier. A considerable portion of the dura should be excised to permit herniation of the cerebellum. The operation is completed by careful approximation of the muscles, aponeurosis and scalp.

THE SURGICAL TREATMENT OF SUB-TENTORIAL CYSTS AND TUMORS.*

By ANDREW STEWART LOBINGIER, M. D., Los Angeles.

It may be said with a large element of truth that the diagnosis of intracranial growths is now based upon data which formerly was either overlooked or failed of proper interpretation. In this respect there has been quite as great advance as in the appreciation of the early and classic evidences of gall stones or of gastric ulcer. There was a time in the very near past when these pathologic conditions were known only as their terminal complexes made them evident.

If we are to accomplish anything vital in the surgery of the brain it must come through the earliest possible recognition of intracranial lesions. This can only be realized by discarding an ancient and misleading symptomatology and in its place establishing proven and dependable evidences of the very beginning of pathologic change. We have had illuminating examples in recent reports of what

some of these now well established evidences of intracranial tension are; they have always existed and have only waited an intelligent reading of their significant meaning.

May we not hope that soon we shall have done with mistaking cysts for hysteria, gliomas for neurasthenia; and neuro-retinal edema as significant chiefly of nephritis? The causes of intracranial tension are not so few nor so rare that we should stubbornly persist in finding extraneous causes for the real and palpable symptom complex.

If inspiration may come from the Queen's Square, Augusta and Johns Hopkins clinics, the brilliant work of Horsley, Krause and Cushing should encourage those interested in this field of surgery to work the more earnestly, that those upon whom the burden of diagnosis shall fall will read these melancholy signs early and accurately. A papilloedema allowed to pass unrelieved beyond De Schweinitz's fifth class into a hopeless optic neuritis, Horsley calls a crime. A tumor allowed to grow for years at the expense of a large, active area of the brain, without detection until inoperable and beyond relief is equally a grave reflection. One is continually amazed at the elaborate effort exerted to class these cases in some other—any other, category than brain tumor. Why is this true? The encephalon is not *terra incognita* to many who have given this field studious attention. It is true as Cushing says, (*Lancet*, Jan. 8, 1910) that "intracranial surgery from a technical standpoint is unlike all other forms of surgery in that the delicate structures involved cannot be handled with sponge and clamp and ligature as can the tissue of the body with which the surgeon is more familiar. It is far easier to do harm than good by the rough and rapid operative measures so commonly employed.

"Familiarity with special methods of manipulating a brain under tension, of controlling hemorrhage from the cerebral substance without insult to the tissues, of avoiding injury to the pia-arachnoid until actual extirpation is attempted are essential to success in the work."

It frequently happens that a diagnosis is made only after years have elapsed through which the tumor may not only have caused irreclaimable destruction of the auditory nerve and the retina but grown to such a size or into such a vital area that its removal is impossible, as the following case illustrates:

Wm. F. S. Age 30 years. Born in Minnesota. Was quite normal up to Nov., 1908, when he began to notice the beginning of his present trouble. It began by loss of appetite followed later by vomiting, chiefly after meals and in the morning. He developed a peculiar prickling pain in the occiput which seemed aggravated upon rising from bed or suddenly changing his position. If he remained quiet it did not trouble him. His gait began to incline to the left. Because his nausea and vomiting steadily grew worse it was thought he had a malignant ulcer of the stomach. He consulted celebrated gastrologists and surgeons in the west and after a thorough examination he was sent home with a diagnosis of "general debility." In the latter part of February, 1909, he first noticed failing vision. In March, 1909, he and his family came to California. The headache and vomiting continued

* Read at the Forty-first Annual Meeting of the State Society, Santa Barbara, April, 1911.

in an aggravated form and he developed diplopia. His gait was staggering, he frequently stumbled necessitating his using a cane and he had some trouble swallowing. In April he first observed tremor in his left arm. There were times when his nausea and headache were diminished. When looking quietly to the side he would suddenly become dizzy even while sitting. Since April a gradually increasing deafness in the left ear was noticed. His left knee gives way if he attempts to stand on his left foot and he has cephalic inclination to the left.

Drs. Wehrley and Orbison, through whose courtesy I was permitted to see this patient, suspecting cerebellar tumor had repeatedly urged him to have it enquired into surgically. When the patient finally came to me September 11, 1910, he had nausea, headache, partial blindness, absolute deafness in the left ear, staggering gait, an atypical nystagmus and examination of the fundus by Dr. Montgomery revealed a bilateral papilloedema more intense on the left and dyschromatopsia. It did not require further data to arrive at a diagnosis of tumor pressing on the acusticus and at operation done on the 14th day of September, 1910, a deeply lying growth of ovoid form, 4 centimeters by $2\frac{1}{2}$ centimeters in dimension with several cysts the size of small nuts grouped about it, was found lying within the left lobe of the cerebellum impinging on the left auditory at the pontine angle and extending for a centimeter and a half bordering on the pons and medulla. On two attempts to lift the growth from its attachment the respiratory center was so disturbed that respiration ceased,—on the second attempt only to recover after a long interval and artificial measures to restore the equilibrium of the center had been used. Unwilling to make further attempt to enucleate the tumor at the time the wound was closed. The patient lived nine hours after the operation.

Apart from the importance of posture of the patient and the choice of anesthetic, the approach to the cerebellum is attended with sufficient difficulties to justify the consideration of some of the more important features. Whether we elect to employ the quadrilateral flap of Krause or the cross-bow incision of Cushing, hemorrhage from the soft parts and from those emissary veins lying posterior to the mastoid cells is a problem of first importance. It not infrequently happens that an emissary vein may require plugging with a sterile basswood cone before the flow can be controlled. This will usually be necessary in veins over four m. m. in diameter. The smaller ones may often be controlled by crushing in the periphery of the opening in the external table with a blunt instrument devised for the purpose. Control of hemorrhage from the soft parts covering the occiput would be a very simple procedure were it possible to use the tourniquet here as in operations on the cerebrum. It is necessary therefore to proceed in the uncovering of the cerebellar region with such care and deliberateness as will insure a minimum loss of blood; and any one who has had a measurable experience in cerebellar operations will not fail to accord exceptional care to hemastasis.

If the subtentorial space has been under tension for any considerable time the skull may be thinned down to a millimeter in thickness. The greatest caution should be used to avoid opening into the subpial space in cutting through the thin table. One rarely encounters sufficient hemorrhage from the hardened and thinned diploe requiring the bone wax. Only when well toward the mastoid cells or

above the lateral sinuses or near the foramen magnum may diploe oozing be annoying and it is easily controlled by Horsley's wax.

One of the most valuable suggestions in exposure of the cerebellum is that of Cushing wherein the dura instead of being opened first beneath the transverse sinus causing immediate and embarrassing extrusion of the lobe under tension, is incised low down next the foramen magnum. This quickly drains off the spinal subtentorial fluid, relieves the tension, avoids herniation and bleeding from the exposed lobe or crowding downward of the medulla into the spinal canal. The cerebellum sinks back into place allowing a clearer field for work and the shock of depression arising from sudden change of pressure is averted.

Duret called attention years ago to the fact that there was a great difference in the various portions of the brain as to the degree of shock attending its manipulation. Horsley believes it "obvious that inasmuch as the nerve centers of organic representation are situated in the posterior fossa of the skull opening of this region might theoretically be expected to cause more shock symptoms than the opening of other parts." Horsley's statistics show two and a half times the mortality in operations on the cerebellum as compared with motor area of the cerebrum. (Toronto address, July, 1906.)

His tabulation shows a ratio of:—

Motor area	1 death in 27 operations
Parietal post parietal region	1 death in 19 operations
Frontal region	1 death in 13 operations
Temporal region	1 death in 12 operations
Cerebellar region	1 death in 10 operations

Harvey Cushing in his Liverpool address (*Lancet*, Jan. 8, 1910), reports 35 operations on the cerebellum up to that time with 4 deaths, one from post operative pneumonia, which he believed induced by faulty posture; a second from hemorrhage from a tumor of highly vascular nature arising from the region of the corpora quadrigemina; a third from *status lymphaticus*, and a fourth from an effort at the first sitting to enucleate a portion of the wall of a very extensive gliomatous cyst. "In fourteen out of thirty-five suboccipital operations the tumor was not found and the procedure was abandoned as a simple decompression with the usual degree of palliation."

Cushing sums up: "In this group of 35 cerebellar operations there have been 4 operative fatalities (11.4%), thirteen successful extirpations or cyst evacuations (37.1%), fourteen operations abandoned or decompressions (40%) with complete abeyance of symptoms in many instances and two cases (5.7%) in which practically no betterment occurred. In view of the fact that cerebellar tumors are regarded by many as particularly unfavorable for operation these figures are encouraging and we may hope for a still better showing in the future when surgical treatment will be instituted at an earlier period of the disease. Even with our recent improvement in this respect the fact that 12 of these 35 patients were blind or nearly so at the time of operation shows how dilatory we still are in these matters."

The statistics and observations of Sir Victor Horsley on subtentorial operations and the fact that Cushing found it impossible to proceed beyond a decompression and cautious exploration in 14 out of 35 cases, obviously confirms a well grounded respect amongst surgeons for this region. The proximity to the bulb and the suddenly disturbed and readjusted intracranial tension after long residence of a cyst or tumor near the tract of organic representation, are in themselves sufficient to account for this care and patient conservatism in surgical manipulations in this field.

There is a class of cases which often affords great doubt as to a definite anatomic localization. These growths may be either solid or cystic; it is their situation which may give rise to considerable confusion. As a rule their position may be best determined by a process of exclusion in which the lateral recess, the vermis and bulb may be consecutively considered.

Cysts of the cerebellum may be pial or parenchymatous. The latter are not infrequently, if of long standing, the residuum of substantive hemorrhages or degenerated gliomata. They are as often found in the lateral recess and impinging on the bulb as within the lobes of the cerebellum. I have several times found them associated with solid tumors. They may be so deep seated as to be impalpable even by the most careful exploration. A case recently under observation of the writer is one in point:

The patient, a young man of thirty, first became ill six years ago. After a succession of colds he was sent to a ranch for nine months; he was greatly improved and returned to work. A year previous to his giving up his work he had vomiting attacks. His digestion was thought at fault and chronic adhesive appendicitis occasioned the removal of his appendix. The benefit was but transient and later he went to a celebrated clinic in the west, where no organic lesion could be found and he was pronounced a "cheerful neurasthenic" and advised to "return home and as far as possible live out of doors." The retina was not examined at this time. On his return his discs were examined, showing papilloedema, which together with vomiting, headache and uncertain gait, led to the recommendation of decompressive operation. Somewhat later this was abandoned because of an apparent improvement in the retina. Later his symptoms grew more aggravated. A Moro test for tuberculosis proved positive. Under the exhibition of tuberculin his nausea and vomiting made considerable improvement. Five months ago when through the courtesy of Dr. Cole and Dr. Thorpe he came under my care for surgical relief, his symptoms had again become aggravated. Nausea still persisted, his vision was decidedly impaired and occipital headaches constant, with papilloedema more intense in the left disc. Palpation showed the left occiput slightly more sensitive. Nystagmus if ever present was not constant. There was no interlacing of the color fields.

Exposure of the cerebellum showed thinning of the skull to a millimeter over the left lobe; a trifle thicker over the right. Pulsation was practically nil over the left lobe. On opening the dura and exploring both lobes and the lateral recesses neither cyst nor tumor could be discovered. Nevertheless the left lobe was soft and extended more than a centimeter through the cranial window. A few days after the operation the headache and nausea were relieved, but a week later it was apparent that the left lobe was again under plus tension, and a fortnight later it discharged fluid freely into the dressing. From the depth of the cavity and the amount

of gauze required to pack it, it was evident that a cyst of considerable size had been evacuated. Since the operation the papilloedema has practically cleared up and the nausea and headache had, until within a few weeks, greatly improved. A later observation shows the cyst to be refilling with aggravation of the headache, nausea, and uncertain gait. The patient has consented to a secondary and radical operation to be done in the near future.*

This case shows the disappointment which may result even when a very ample exposure and double decompressive procedure are undertaken, where the growth is too deep-seated to be reached by finger or spatula exploration and where the manipulations were carried to the very border of a lethal issue. Cases of this sort and tumors too deeply complicated with the bulb for primary exploration fall readily in the category of those for which Horsley's two stage procedure is indicated. We may well quote Cushing's axiomatic doctrine here—that "safety is more essential than haste." There are conditions involving the retina and the nutrition of the patient which make it imperative that the intracranial tension causing the optic neuritis, vomiting and depressing headache be relieved with the greatest promptitude. In such cases a decompressive measure is distinctly remedial; and if the effective and radical extirpation of the growth cannot be done with safety at this first intervention it should properly be deferred until conditions are more favorable. It will frequently be found that the tumor or cyst will present most conveniently at the second exposure and may be easily extracted or packed out.

The reports in later years emanating from authoritative workers in intracranial surgery are decidedly encouraging and should inspire a definite and persistent effort and purpose amongst those of us interested in this field of surgery, to do more careful and painstaking work. We should encourage by every influence we may exert an early and precise recognition of the evidences of organic intracranial tension; and in this connection the minutest changes in the retina should be observed from the very beginning.

We cannot close with more fitting words than those of Harvey Cushing: "Earlier diagnosis and more prompt interference, a wider experience in overcoming the technical difficulties of these cases coupled with the courage to work slowly and painstakingly,—these things will lead to increasingly better results in this responsible work, the success of which depends so greatly upon detail, patience and the expenditure of time."

Discussion.

Dr. H. G. Brainerd, Los Angeles: I want to add a word in regard to the difficulty of diagnosis in these cases. The clearing up of the diagnosis in the last ten years has come almost entirely through the study of the eye, so far as I know. I wish to refer to the case twice mentioned this morning by Dr. Lobingier. This man was under my observation for ten years or more and the first trouble which he experienced was after prolonged work with his eyes, when he developed neurasthenic symptoms. He was relieved of these symptoms by a rest upon a ranch, and was able to resume his work as bookkeeper for two and

* Since the above was written I removed a cyst containing an ounce of clear fluid from the center of the left lobe. The patient has made a good recovery.

a half years with brief vacations without real loss of time. Then he began to develop (this was five or six years ago) morning vomiting. After this he was lost sight of for a while. The next I heard was that he had had an appendectomy and was relieved of his symptoms. He got well and went to work again. Later, when visiting his family, I heard of him again—that he had been greatly benefited by taking atoxyl, and up to the time that I saw him—about six weeks before the operation—he had developed no cerebellar symptoms whatever, unless it was the vomiting. In the meantime he had worked again and then got worse and went East to a noted clinic, where he had been told that he was a neurasthenic. After he came home he had a course of tuberculin, which benefited him and relieved the symptoms. When I last saw him there were distinct cerebellar symptoms and I thought he had intracranial pressure but did not know where to locate the lesion. The symptoms had been shifting and part of the time were certainly neurasthenic. This all goes to show the difficulty of diagnosis. There was another, the case of melanotic sarcoma presented by Dr. Orbison. I saw the man just before he was operated upon and death occurred. He was a working man who had been digging a well, when another workman let drop a bar on his head, which had cut the scalp somewhat, requiring a few stitches. He had walked home a distance of a couple of miles and had gone to bed with increasing headache. Four weeks after that he was comatose with a history of steadily increasing stupor. His wife said he had always been well and strong and had had no injury or illness up to the time of the blow on the head. At operation we expected to find a hematoma, but instead of that exposed a melanotic sarcoma, and then for the first time learned the history of the removal of a sarcomatous testicle a few months prior. There is a point of importance in dealing with these cases surgically, and that is the danger of anesthetic—ether especially—in cases of cerebral growth. I have seen two cases that died of the anesthetic before the surgeon touched them and two other cases die as a result of the anesthetic immediately after operation.

Dr. Cullen Welty, San Francisco: In the diagnosis of cerebellar tumors there seems to be a great deal of confusion. Of all the men that have so far spoken, not one has grouped a certain lot of symptoms that are present in all cases, namely, deafness, vertigo and nystagmus. Before proceeding further, what other lesions might produce such symptoms? They are comparatively few and can be differentiated very easily. Acute Meniere's disease, fracture of the bone through the fibrous portion of the temporal bone, acute or chronic suppuration of the labyrinth. To return and analyze deafness, vertigo and nystagmus, it is quite essential that the examiner understand in detail the use of the tuning forks. We have two great forms of deafness that can be very easily differentiated. We have another form of common deafness (adhesive process) that is again easily differentiated from the other two forms. In the two forms of organic deafness, the ears are practically the same, there will be so little difference that a marked deviation from this established finding will attract your attention at once. So when you have a decided change, you must look carefully for other symptoms which you will be able to find. It is strange, however it is true, that the great majority of adhesive processes affect both ears equally. However, this is not to be relied upon so absolutely as in the other two forms of deafness—nevertheless they are usually about the same, at the same time an adhesive deafness is amenable to treatment and the organic forms are not. Again, the adhesive form reaches the same degree of marked deafness. With the simple analysis of deafness you can readily see that you are well on your way to a correct diagnosis. The other conditions that might be confusing at this place are as follows: Meniere's disease, fracture of the base through patulous portion

of temporal bone, acoustics tumor, and purulent, non-purulent affection of the labyrinth. As you can readily see it will be comparatively easy to study your case and make a diagnosis with the associated history. I started out calling particular attention to the associated symptoms: deafness, vertigo and nystagmus. It must be remembered that vertigo and nystagmus are always associated; at the same time you can have a physiological nystagmus. However, such nystagmus will be equal to the right or left, in contradistinction to an induced nystagmus, that will be more in one direction than another. Sometimes this is hard to determine; an instrument called by the name of an astigmometer will measure accurately this difference in degree. As to the form of nystagmus—horizontal, rotary or vertical is immaterial. It will be found that sometimes the nystagmus is to the right, left or horizontal. This is dependent on the location of the lesion or to the canal most involved. At the same time the position of the head will change the nystagmus,—this is dependent upon the position of the canal in relation to the head. Again, the new growth may be so situated as to cut off communication from Deiter's area, and you have a nystagmus from an overbalance of the canals. This can be proven or disproven by the caloric reaction. Deafness, vertigo and nystagmus can be produced by an acute or chronic suppurative pressure. The differential diagnosis between cerebellar tumor and semicircular canal is made easy by the fact that the cerebellar cases will fall in any direction, while those with a lesion of the semicircular canal will fall in a certain definite direction that is dependent upon the position of the head and the semicircular canal involved. The differential diagnosis between cerebellar tumor and cerebellar abscess following labyrinth operation, where the nystagmus has been to the opposite side and returns to the same side is proof positive of a cerebellar abscess. Equilibrium disturbances are quite characteristic and when studied in detail will produce positive and negative conditions that go far in further confirming the diagnosis. Only a few months ago Dr. Lennon of San Francisco reported five cerebellum cases studied in detail. In each and every one of these cases the findings of deafness, vertigo and nystagmus were quite apparent. In fact, the doctor called attention to the associated symptoms. Nystagmus and vertigo have been very carefully studied recently by Barrany of Vienna, and it is to him that we are indebted for these valuable aids in diagnosis. Where you have such definite findings the diagnosis should not be so confusing as some of the speakers would lead us to believe.

Dr. Mark Emerson, Oakland: Both these papers have been very interesting and instructive to me. Dr. Terry made no special reference to lymphatic drainage; perhaps it was not necessary, as that should be inferred. Yet I feel that some emphasis should be placed upon this feature. The lymphatics are more active than we give them credit for. The lymphatic edema which sometimes follows the radical operation for removal of the breast gives us an idea of what interfering with their drainage will do. Of the hundreds of inches of brain surface under tension, with intracranial troubles, the removal of a small piece of bone will do very little good if there is no permanent lymphatic communication established. Lymph spaces surround the dural blood vessels, and the degree of communication of these peri-vascular intracranial lymph channels with the outer lymphatic system will determine the permanency of your results, especially in internal hydrocephalics and other lesions where pressure symptoms are manifest. Instead of removing a round piece of dura as advised by the essayist, if a stellate piece is elevated and reflected over the knife-like edge of the thin temporal bone and tucked or sutured beneath the periosteum, we eliminate that annoying feature of clot or oozing from the injured delicate pia vessels forced out with the small or large hernia that follows, for the blood clot undergoes further degeneration, which prevents com-

munication, which is the important thing in this class of work.

Dr. W. I. Terry, San Francisco: In regard to the position during operation on the cerebellum, the elevated position of Krause would be good except for the manual difficulties of getting at the base of the brain, because considerable control of hemorrhage can be obtained by posture. Dr. Brainerd spoke of ether as being dangerous in these cases. That is true if you do not have a skilled anesthetist. Where you have a skilled anesthetist who devotes himself preferably to anesthesia, you do not need to fear that. Where the anesthetic is given without due regard to the patient's condition and where a large amount of anesthetic is given and the patient struggles, I think it makes a big difference. I am glad Dr. Welty spoke of the ear disturbances. They are very important. Dr. Emerson spoke about the decompression. There are cases on record of long standing cures and even some where the tumor entirely disappeared following a simple decompression. I had one man, a cerebellar case with a large tumor I could not remove in the cerebello-pontile angle. The man is still alive after four years with a hernia of the cerebellum. He was blind before I operated on him and still is. I do not agree that decompression is an unnecessary measure. The establishment of lymph drainage is probably important but I do not think turning the dura mater over the edges of the base is going to accomplish that alone. The dura mater should be removed in a decompression and certainly your lymph channels will be established between the brain and the muscle.

Dr. A. S. Lobingier, Los Angeles: Cushing in his Liverpool address described his experimental production of papilloedema by pure mechanical pressure on the brain itself; pressure was made over the dura at the time of operation and observations of the retina made at the time. It is his firm belief that papilloedema is a distinct pressure edema. The development of a true retinitis is a later substantive change.

Hysteria and disturbances referable to certain functional nervous conditions, gastric ulcer and many other conditions, have been constantly confused with intra-cranial tension, and I wish to draw your attention to the relation between the disturbances of the stomach and the retinal findings. One hears extended reports made in the examination of these cases in which the retina has almost entirely been ignored. If the contributors to this symposium have succeeded in giving sufficient emphasis to the necessity of observing the retina constantly in every suspected brain lesion, these discussions this morning will not have been in vain. Dr. Orbison called attention to early diagnosis. I think the specimens he showed were illuminating illustrations of what might have been done were an early diagnosis made. With regard to the question of posture brought up by a speaker, the semi-sitting position was first suggested by Horsley; Krause adopted this because he felt with Horsley that it produced anemia of the brain and much loss of blood would be thus spared. There is no question that in the ordinary brain operation the semi-sitting posture has its advantages. In the subtentorial cases it is obviously not advantageous. I think Cushing's posture in subtentorial operations is decidedly to be preferred. Of course Cushing elevates the shoulders. Horsley has emphasized in all his lectures the necessity of using chloroform instead of ether but it must be remembered he measures it accurately by the Vernon Harcourt apparatus, and has oxygen at hand to be used when the blood darkens. We have already alluded to the danger of spinal puncture. Dr. Terry referred to Horsley's new operation in respect to gumma. I do not believe any man is better able to speak on that subject than Sir Victor. There is a material advantage he thinks in relieving the intracranial tension before anti-syphilitic treatment is undertaken. Cushing has advocated an admirable technic in subtentorial exposures whereby a large covering

of fascia and muscles is preserved. I have a number of times found advantage in this protection where a large amount of bone was necessary to be removed.

I think Dr. Welty has scarcely heard all that has been said in respect to the necessity of examining the ear carefully in subtentorial growths. I no more think of making a diagnosis in these cases without having the ear gone carefully over than I do of not having the eye examined. I mentioned nystagmus and vertigo and think they have a very close relation to the ear itself and also to any growth or tension in the subtentorial region.

FUNCTIONAL INSUFFICIENCIES OF THE MYOCARDIUM.*

By H. D'ARCY POWER, M. D., San Francisco.

I have not chosen the subject of this paper on account of any new light I can shed upon an old story nor have I any extensive series of cases to record but, because in the daily run of general practice, the victims of the condition I am to deal with, are numerous and constitute an important element of our clientele. Yet, nevertheless, their symptoms are too often misinterpreted; sometimes, perhaps, unavoidably so. By relative functional insufficiencies of the myocardium, I refer to all those cases in which the heart is unable to perform its normal work, within reasonable limits of strain, without subjecting its owner to discomfort or distress, and in which there is no ground to affirm gross or microscopic changes in its structure. This last statement is not intended to cover temporary alterations of form or position. Nor is it proper to include therein conditions of pain or discomfort without manifest insufficiency. It is needless to thresh over the question as to whether functional insufficiency can exist without a morphological basis. It is safe to affirm that structure is as dependent on integrity of function as the reverse.

In our daily practice, we meet with two distinct classes of cardiac affections. First, organic lesions manifesting the well known indications of valvular defects, myocardial degeneration and change. These conditions may be compensated or latent, but they do not admit of a *restitutio ad integrum*, and they are at all times possible of recognition. Secondly, the cardiac neuroses, that under many names, and with a varied symptomatology, are, for the most part, reflex manifestations of disease elsewhere. Precordial pain, false anginas, tachycardias, and bradycardias, arrhythmia, and vaso-motor ataxias, constitute a numerous and increasing class of ailments that can exist transiently, or some times permanently without either clinical signs or organic change in the heart. There is a third group in which physical examination either fails to reveal myocardial change, or such alterations of form or action as may from time to time occur, are variable or impermanent, and not discoverable post mortem. Nevertheless these patients manifest symptoms that are only explicable on the assumption that the heart is, at the time of their occurrence, unable to adequately perform its functions. Thus we have individuals in whom all exertion is ac-

* Read before the Forty-first Annual Meeting, State Society, Santa Barbara, April, 1911.